Reconfigurable Ultra-Low Power Miniaturized EVA Radio, Phase I

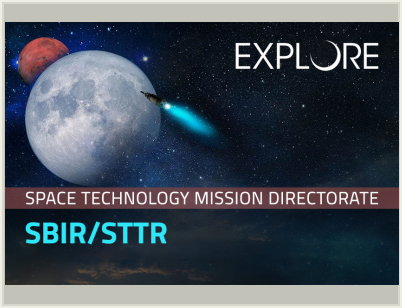
Completed Technology Project (2009 - 2009)

Project Introduction

EVA radio is an important integral part of lunar missions and beyond. To minimize power consumption and mass of an EVA radio, innovative solutions are needed for the design of various modules ranging from RF front end to networking protocols. In this protocol, a comprehensive design architecture that can achieve ultra-low power miniaturized EVA radio is proposed. Under this architecture, new MEMS-based technologies are employed to dramatically reduce the power consumption of RF front end and transceiver. By exploiting commercial wireless technologies in baseband and medium access control (MAC) modules, the EVA radio is also conformant to standard commercial wireless networks. Power consumption in baseband and MAC modules is minimized by selecting the most power-efficient design among commercial products. To further minimize power consumption during communications, power-efficient protocols across different layers are proposed. Such protocols are QoS-oriented and can support self-discovery, self-configuration, and self-healing of ad hoc networks formed by EVA radios. As an additional feature to the EVA radio, a navigation and location tracking scheme is also proposed in this proposal.

Anticipated Benefits

The proposed technologies will be very beneficial to many DoD applications in military operations, such as battlefield communications and networking. The technologies of ultra-low miniaturized radio can find lots of applications on the non-government market. The most promising application area will be IEEE 802.11 radios and networks. Today IEEE 802.11 radio consumes too much power, which is currently a huge obstacle to integrating IEEE 802.11 radios into battery-powered devices such as cell phones, PDAs, laptops, palm PCs, and so on. The ultra-low power radios and networking protocols can also find potential applications in wireless sensor networks, vehicular networks, disaster-response networks, under-water networks, as they all demand ultra-low power radios and the supporting power-efficient protocols.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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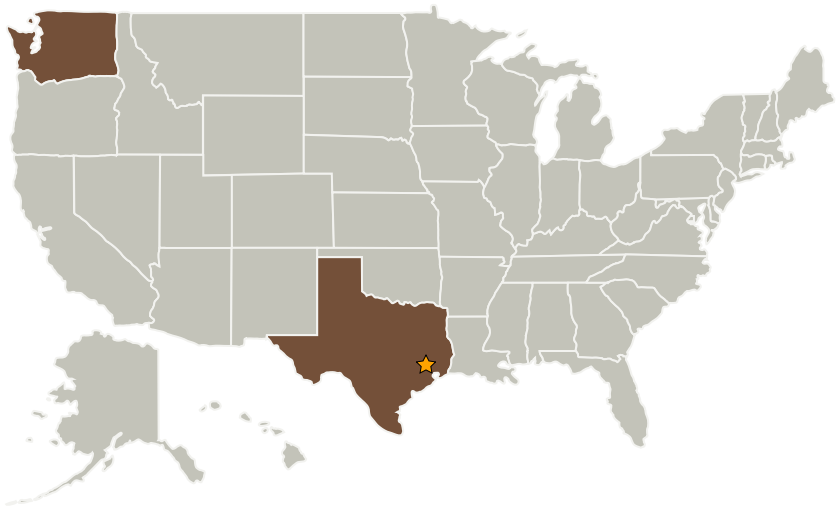
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Teranovi Technologies	Supporting Organization	Industry	Kirkland, Washington

Primary U.S. Work Locations	
Texas	Washington

Project Management

Program Director:
Jason L Kessler

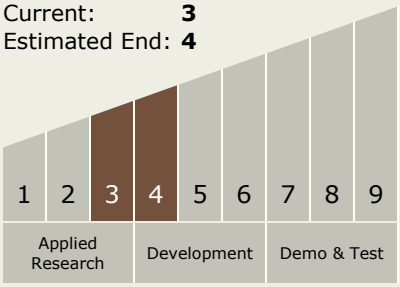
Program Manager:
Carlos Torrez

Project Manager:
Andrew L Benjamin

Principal Investigator:
Xudong Wang

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.1 Software Development, Engineering, and Integrity
    - TX11.1.6 Real-time Software